



A BOM is a list of all materials needed to complete a structure. It is based on takeoffs and estimates of the materials needed. It includes item number (parts and materials), name, description, unit of measure, quantity and, where called for, the stock size and number, and sometimes the weight. The carpenter uses it when ordering materials.

A BOM is usually made up by the draftsman when the original drawings are prepared. However, when no BOM accompanies field prints, it must be developed up by the construction crew. For this reason, a carpenter should be able to develop a BOM, as well as work with one. Accuracy can best be obtained by having a separate bill prepared by at least two estimators. The bills may then be compared and one copy corrected or both used to make up a final BOM.

Before a BOM can be prepared, a materials takeoff list and a materials estimate list are prepared.

MATERIALS TAKEOFF LIST

The first step leading to preparation of a BOM is a materials takeoff list. This is a list of all parts of the building, taken from the plans, usually by tallying and checking off the items indicated on the drawings and specifications. Both architectural and engineering plans provide the names and sizes of the items that are to be listed.

For example, Figure 3-1 (page 3-2) shows a plan for the substructure of a 20- x 40-foot TO building. Table 3-1, page 3-3, is the materials takeoff list for this building. This list identifies all parts of the building, starting with its base and working upward. The following paragraphs are an example of computing the materials needed for the footers.

Look at the first and second columns of the materials takeoff list. The first column gives the *item* (footers); the next column gives the *number of pieces (46)* needed to make up the item.

The 20- x 40-foot building shown on the plan requires 15 foundation posts. Since three pieces are needed for each footer, a total of 45 pieces is needed.

The *length in place* (1 foot 5 inches) is the actual length of the member after it has been cut and is ready to be nailed in place. The *size* (2 x 6) refers to the nominal size of the lumber. The *length* refers to the standard lengths available from the lumberyard or depot, such as 8-, 10-, and 12-foot pieces of stock.

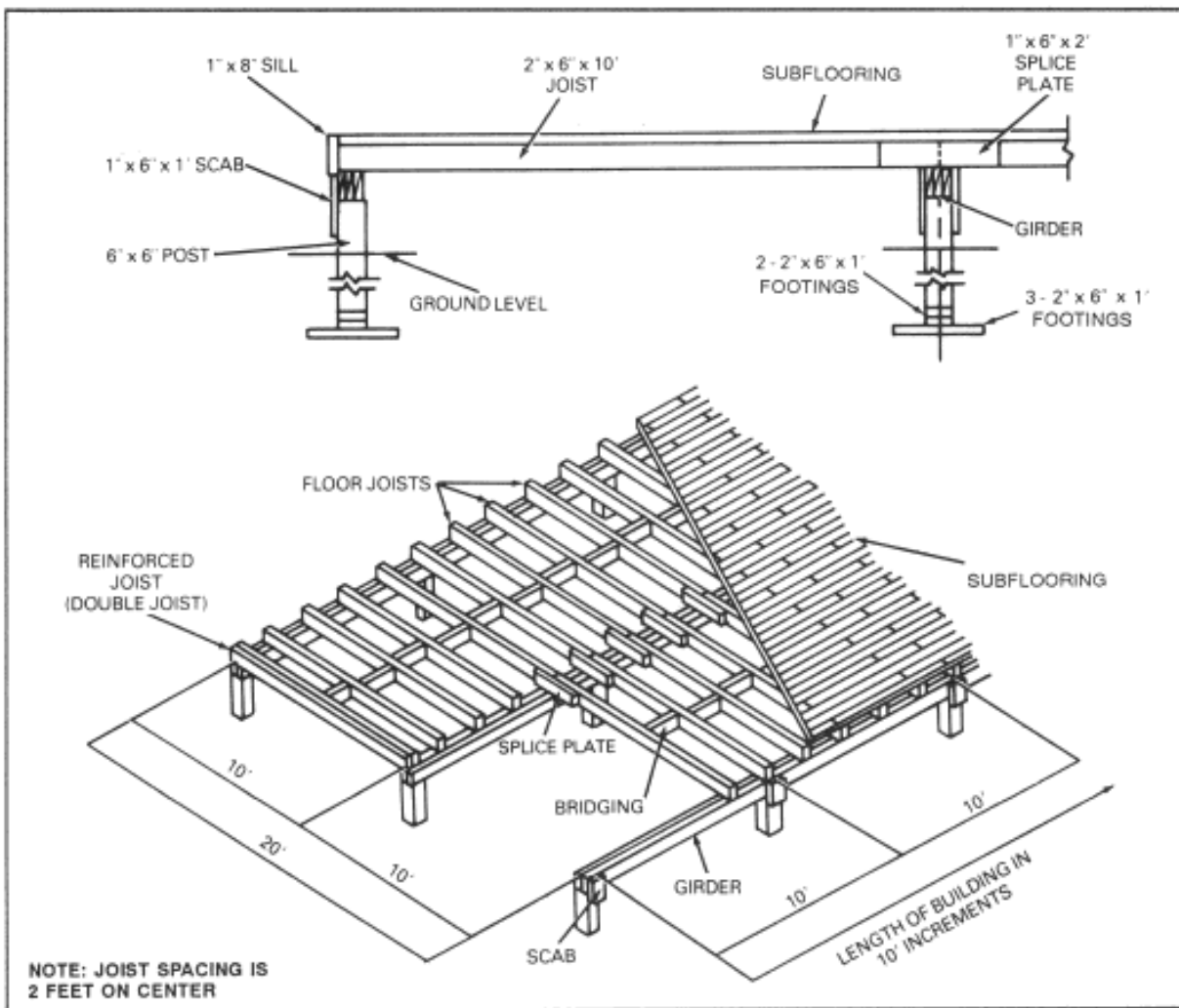


Figure 3-1. 20- x 40-foot TO building substructure

Table 3-1. Materials takeoff list for a 20- x 40-foot building

ITEM NAME OR USE OF PIECE	NO. OF PIECES	UNIT	LENGTH IN PLACE	SIZE	LENGTH	NO. PER LENGTH	QUANTITY
1. Footers	45	PC	1'- 5"	2x6	10'	7	7
2. Spreaders	30	PC	1'- 4"	2x6	8'	6	5
3. Foundation Post	15	PC	3'- 0"	6x6	12'	4	4
4. Scabs	20	PC	1'- 0"	1x6	8'	8	3
5. Girders	36	PC	10'- 0"	2x6	10'	1	36
6. Joists	46	PC	10'- 0"	2x6	10	1	46
7. Joist Splices	21	PC	2'- 0"	1x6	8'	4	6
8. Block Bridging	40	PC	1' - 10 $\frac{3}{8}$ "	2x6	8'	4	10
9. Closers	12	PC	10'- 0"	1x8	10'	1	12
10. Flooring	800	BF	RL	1x6	RL	—	—

Select the most economical length for the 15 footers. Convert the required length to available lengths for economical use. Seven 1-foot 5-inch-long pieces are cut from each 10-foot piece of stock; 45 1-foot 5-inch pieces require seven 2 x 6 x 10 pieces. Leftover material can be used for bridging.

Table 3-2. Materials estimate list

ITEM	SIZE & LENGTH	UNIT	TAKEOFF QUANTITY	WASTE ALLOWANCE	ADDITIONAL REQUIREMENTS	TOTAL QUANTITY	BD FT MEASURE
1.	6 x 6 x 12	PC	4	1	None	5	180
2.	2 x 6 x 10	PC	89	9	None	98	980
3.	2 x 6 x 8	PC	15	2	3 For Temporary Bracing	20	160
4.	1 x 8 x 10	PC	12	2	None	14	91
5.	1 x 6 x 8	PC	9	2	2 For Batter Boards	13	52
6.	1 x 6 x RL	BF	800	160	None	960	960
7.	16d	LB	—	—	36 Nails, Framing	36	—
8.	8d	LB	—	—	23 Nails, Flooring	23	—

MATERIALS ESTIMATE LIST

The materials estimate list puts materials takeoff list information into a shorter form, adds an allowance for waste and breakage, and makes an estimate of required quantities of material. These materials include nails, cement, concrete form lumber, tie wire, and temporary bracing or scaffold lumber. (Table 3-2 is a sample materials estimate list.)

The first step in preparing this list is to group (from the takeoff list) all pieces of the same size and length. For example, start with the largest size lumber that can be found on the materials takeoff list. Group all the pieces of that same size and length that appear on the list. This groups the total number of each size and length that will be needed. Continue in this way with each size of lumber, working down to the smallest size and length of material.

The sizes and pounds of nails needed should also be added to the list. Two formulas used for estimating the number of pounds of nails needed are shown below:

<i>Estimating quantity of nails required</i>	
<ul style="list-style-type: none"> For flooring, sheathing, and other 1-inch material, use the following formula: 	<ul style="list-style-type: none"> For framing materials that are 2 inches or more, use the following formula:
<i>Number of pounds (2 penny through 8 penny) =</i> $\frac{\text{penny}}{4} \times \frac{\text{board measure}}{100}$	<i>Number of pounds (10 penny through 60 penny) =</i> $\frac{\text{penny}}{6} \times \frac{\text{board measure}}{100}$

For each material size, a waste factor must be added. For flooring, sheathing, and other 1-inch material, add a waste allowance of 2 percent; for all other materials 2 inches and larger, add 10 percent to the total number.

Next, estimate the amount of additional requirements for materials (such as bracing) that are not shown on the plans. Add the total quantity for each size and length of material. If it is used for siding, sheathing, or flooring, convert it to board feet using the method given in Chapter 2 (page 2-5).

BILL OF MATERIALS FORMAT

The information for the BOM (DA Form 2702) is taken from the materials estimate list. The BOM is used to requisition these materials. The materials estimate list contains information on materials needed for a project, but it also contains much information on materials needed for a project, but it also contains much information of little interest to depot personnel. Therefore, use the simplified BOM (DA Form 2702, Figure 3-2) to requisition materials.

The rest of the building would be analyzed in the same way.

ACCOUNT CODE NO. XXXXX	BILL OF MATERIALS For use of this form, see DA Pam 420-6; the proponent agency is CDE.				DATE XX/XX/XX	
PREPARED BY (individual requester)				DESIRED DELIVERY DATE XX/XX/XX	JOB ORDER NO. XXXXXX	
DELIVER MATERIAL TO (requesting unit)				WORK REQUEST NO. XXXXXX		
STOCK OR PART NO.	DESCRIPTION OF ARTICLE	UNIT	QUANTITY	UNIT PRICE	TOTAL COST	
0000-00-000-0000	Lumber, 6x6x12; 180 bd ft	PC	5			
	Lumber, 2x6x10; 980 bd ft	PC	98			
	Lumber, 2x6x8; 160 bd ft	PC	20			
	Lumber, 1x8x10; 94 bd ft	PC	14			
	Lumber, 1x6x8; 52 bd ft	PC	13			
	Lumber, 1x6xRL; 960 bd ft	BF	960			
	Nails, 16d	LB	36			
	Nails, 8d	LB	23			

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GPO : 1983 O - 426-310

Figure 3-2. Sample DA Form 2702